CLAIMS

1. Wireless communication device (10) comprising:
a loop antenna element (18) comprising:
a first section (20) provided in and extending a length in a first plane,
a second section (22) spaced from and provided in and extending a length in the first plane, where the second section extends along the same line as the first section or has a curvature which is a continuation of the curvature of the first section,
a third section (24) provided in a second plane essentially parallel to the first plane and essentially aligned with the first and second sections, and
a fourth (26) and a fifth section (28) interconnecting antenna sections provided in the first and second planes,
wherein the antenna sections form a three-dimensional structure having a substantial two-dimensional extension in at least one of the first and second planes.

2. Wireless communication device according to claim 1, wherein the three-dimensional antenna structure at least partly encloses an area in the first plane where a component can be placed.

3. Wireless communication device according to claim 1 or 2, wherein antenna sections in the first and second planes extend in more than one direction.

4. Wireless communication device according to any of claims 1 -3, further including a sixth (30) and a seventh (32) antenna section essentially aligned with each other and provided in the first and the second plane, respectively, where the sixth and seventh sections are generally perpendicular to at least parts of and connected to the first and third section, respectively.

5. Wireless communication device according to claim 4, wherein the fourth section interconnects the sixth and seventh section.

6. Wireless communication device according to claim 4 or 5, further including an eighth (34) and a ninth (36) antenna section essentially aligned with each other and provided in the first and the second plane, respectively, where the eighth and ninth sections are generally perpendicular to at least parts of and connected to the second and third sections, respectively.

7. Wireless communication device according to claim 6, wherein the fifth section interconnects the seventh and eighth section.

8. Wireless communication device according to any previous claim, wherein the first section has a first feeding end (42) and the second section has a second feeding end (44) both provided in the first plane close to each other.

9. Wireless communication device according to any previous claim, wherein the length of the loop antenna corresponds to a full wavelength of an centre frequency in a desired frequency band.

10. Wireless communication device according to any previous claim, further comprising a printed circuit board including a ground plane and radio circuits for the loop antenna element, wherein the antenna element sections are provided along the sides of and bound by the printed circuit board.

11. Wireless communication device according to claim 10, wherein the antenna is provided along at least half of the perimeter of the printed circuit board.

12. Wireless communication device according to any previous claim, further including at least one passive antenna element (50) in a third plane parallel to the first plane and provided on the other side of the first plane than the second plane for providing a resonating circuit or tuning element for the loop antenna.

13. Wireless communication device according to any previous claim, wherein the antenna sections are provided in the form of metallic strips, wires or a combination of both.

14. Wireless communicating device according to any previous claim, wherein the device is a portable communication device.

15. Wireless communicating device according to claim 14, wherein the portable communication device is a headset.

16. Antenna arrangement for a wireless communication device comprising:
a first section (20) provided in and extending a length in a first plane,
a second section (22) spaced from and provided in and extending a length in the first plane, where the second section extends along the same line as the

first section or has a curvature which is a continuation of the curvature of the first section,
a third section (24) provided in a second plane essentially parallel to the first plane and essentially aligned with the first and second sections, and
a fourth (26) and a fifth section (28) interconnecting antenna sections provided in the first and second planes,
wherein the antenna sections form a three-dimensional structure having a substantial two-dimensional extension in at least one of the first and second planes.

17. Antenna arrangement according to claim 16, wherein the three-dimensional structure at least partly encloses an area in the first plane where a component can be placed.

18. Antenna arrangement according to claim 16 or 17, further comprising a dielectric material (56) on which the sections of the antenna element are provided, in order to produce a component that can be mounted on a printed circuit board.